DECEMBER 2002

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ASBMB Today

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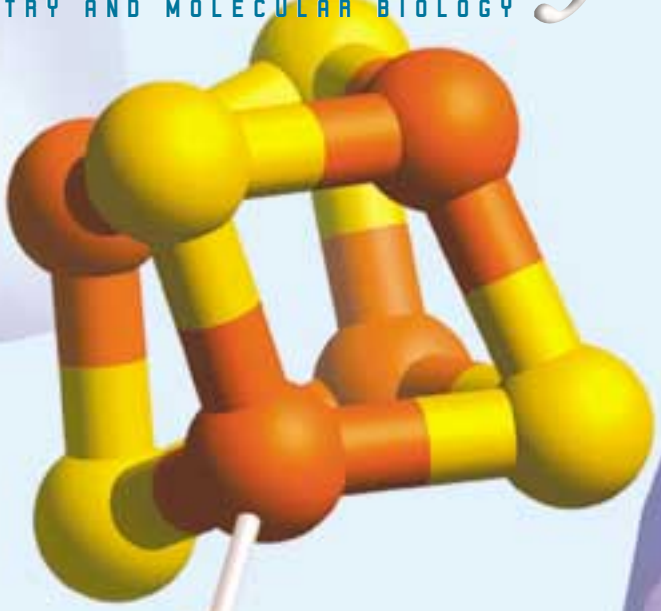
AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY



ALSO IN THIS ISSUE

ASBMB Award Winners Will Address 2003 Annual Meeting

Experimental Biology 2003

ASBMB ANNUAL MEETING at EB 2003 in San Diego

Call for Late-Breaking Abstracts

April 11 – 15, 2003 • San Diego, California

Questions contact:
Experimental Biology 2003 Meeting Office
Phone: (301) 634-7010
Fax: (301) 634-7014
Email: eb@faseb.org

For information about the ASBMB Program, housing, and registration forms, see the ASBMB Annual Meeting Web Site:

www.asbmb.org

Save Money! Register online by February 13 and make your housing reservations by March 7.

"TRANSLATING THE GENOME"

Deadline for Submission:

Wednesday, February 26, 2003

Late-breaking abstracts will be accepted for special poster sessions scheduled on Tuesday, April 15, 2003. The purpose of the late-breaking abstracts is to give participants the opportunity to present and hear about new and significant material. Late breaking abstracts will be published in an addendum to the meeting program; they will not be published in *The FASEB Journal.*

Abstracts must be submitted electronically with payment of $60 and received on or before Wednesday, February 26, 2003.

Abstract Submission Fee: $60

Abstract submission site: www.faseb.org/meetings/eb2003

Submit to ASBMB Topic Categories:

201-ASBMB Biological Catalysis
202-ASBMB Enzymes
203-ASBMB Genomics, Proteomics and Bioinformatics
204-ASBMB Glycobiology
205-ASBMB Lipid Signaling, Metabolism and Transport
206-ASBMB Membrane Assembly Interaction and Transport
207-ASBMB Metabolism – Pathways and Regulation
208-ASBMB Methods
209-ASBMB Molecular Basis of Cell and Developmental Biology
210-ASBMB Nucleic Acid Structure, Function and Processing
211-ASBMB Protein Synthesis, Folding and Turnover
212-ASBMB Science Education
213-ASBMB Signaling Pathways

Experimental Biology
801-EB Computers in Research and Teaching
802-EB Using Models and Demonstrations to Teach
803-EB Teaching and Learning in the Biological Sciences

More Information: ASBMB Meetings Office, 9650 Rockville Pike, Bethesda, MD 20814
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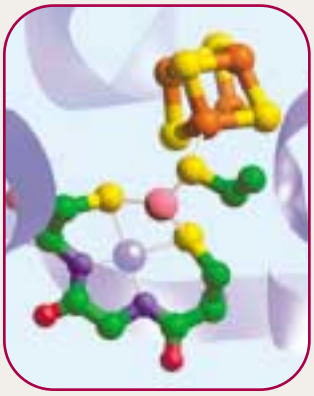

ON THE COVER:

2 Crystal structure of carbon monoxide dehydrogenase/ acetyl-CoA synthase.

Photo by Dr. Catherine Drennan

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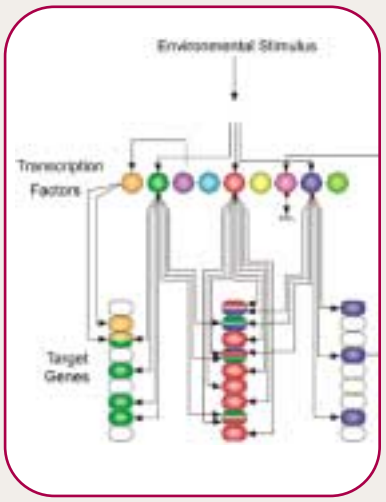

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Comments

Please direct any comments or questions concerning *ASBMB Today* to:

John D. Thompson
Editor, *ASBMB Today*
9650 Rockville Pike
Bethesda, MD 20814-3996
Phone: 301-634-7145
Fax: 301-634-7126
E-mail: jthompson@asbmb.faseb.org

MIT Researcher Wins Schering-Plough Award

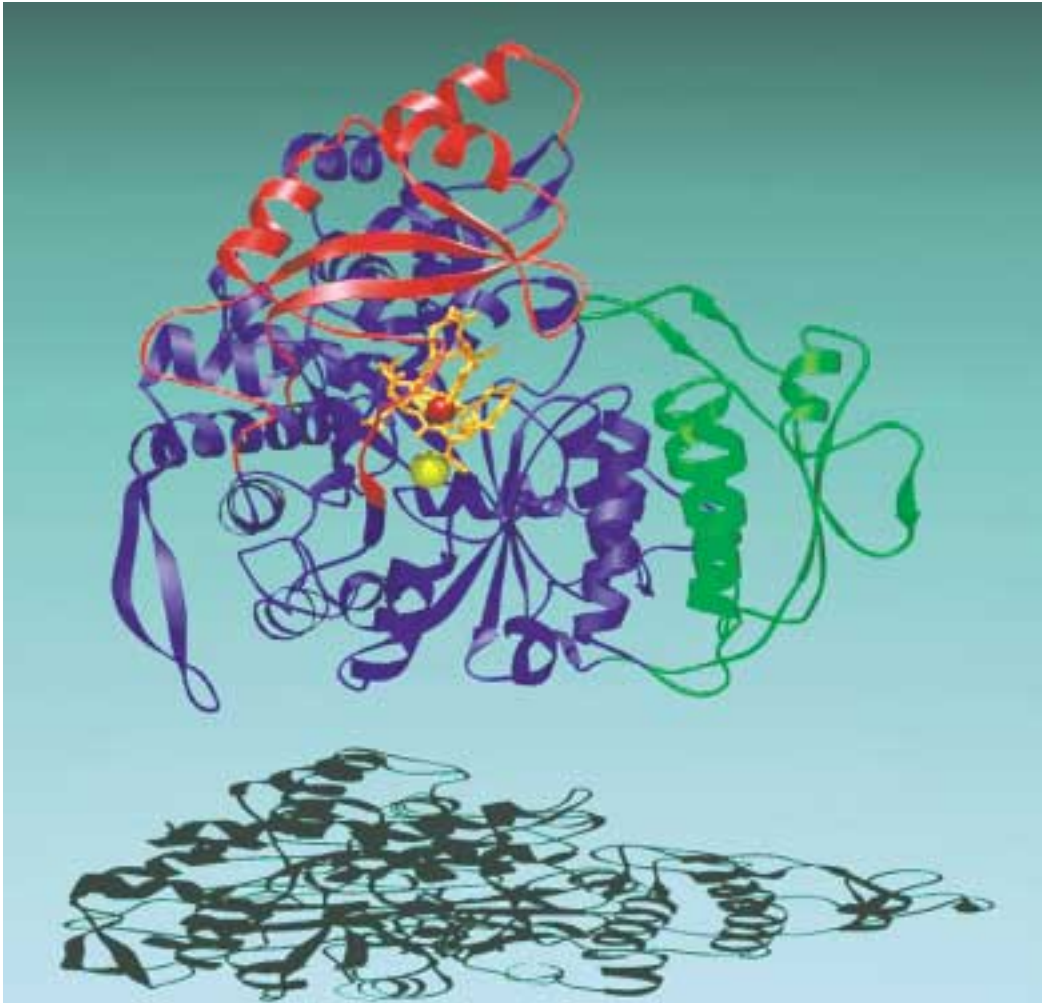
Catherine L. Drennan, Assistant Professor of Chemistry at the Massachusetts Institute of Technology, has been named as the recipient of the 2003 Schering-Plough Award for outstanding research contributions to biochemistry and molecular biology. The Award consists of a plaque, stipend, and transportation and expenses to present a lecture at the 2003 Meeting. In addition, up to $1,000 will be awarded for travel to attend a meeting of the recipient's choice. The recipient must have no more than 10 years post-doctoral experience. Recipients over the past five years include ASBMB member John D. York, Carol Greider, Tania A. Baker, ASBMB member Kun-Liang Guan, and Xiadong Wang. The nominees and nominators need not be ASBMB members.

Dr. Drennan trained as an x-ray crystallographer in ASBMB member Dr. Martha Ludwig's laboratory at the University of Michigan. Early in her graduate career she decided that she wanted to crystallize a protein, methionine synthase, that contains vitamin B12 as a cofactor. The history of x-ray crystallography and vitamin B12 are deeply intertwined. B12 is the most complicated vitamin; indeed the structure of this vitamin is so complex that it was first determined, not with chemical analysis but with x-ray crystallography, by Dr. Dorothy Hodgkins, who won the Nobel Prize for this work. At that time, 1956, B12 was by far the largest molecular structure ever solved by x-ray crystallography. Her structure revealed the first metal-carbon bond ever identified, and started the field of bioinorganic chemistry. And yet, 35 years later, no structure had ever been determined of B12 bound to its working partner, an enzyme. Dr. Drennan decided to determine the structure of methionine synthase.


Dr. Catherine Drennan

Within a short time she obtained beautiful red crystals. The path from crystals to an x-ray structure was not a simple one, and almost four years elapsed before the structure was solved by Dr. Drennan. One major problem was that she had actually crystallized a fragment from a preparation of the whole protein, and no one knew how to facilitate fragment formation. Sometimes she could not obtain crystals for months or even years at a time. Her perseverance paid off richly however, and she was able to solve the structure of the B12-containing fragment of methionine synthase. She immediately realized that B12 has undergone a remarkable conformational change in binding its protein partner, in which a histidine from the protein had replaced dimethyl-benzimidazole as the ligand to the cobalt. That research attracted international attention, including a research article in *Science* and reviews in *Structure* and *Current Opinion in Structural Biology*. Her structure led her to formulate a proposal for the catalytic mechanism of the enzyme that is now being tested in laboratories around the world.

In her first year at MIT, Dr. Drennan, and coworkers in her laboratory, Michael Sintchak and Gitrada Arjara, solved another refractory problem, determining the structure of cobalamin-dependent ribonucleotide reductase. Ribonucleotide reductases come in three flavors, and amazingly show



From RNA to DNA: crystal structure of a class II ribonucleotide reductase. Photo by Michael Sintchak (Drennan Group)

less than 10% homology. They differ primarily in the way in which a thiyl radical, central for catalysis of ribonucleotide reduction, is generated. This structure reveals the fundamental structural similarity of all the different ribonucleotide reductases, as well as providing fascinating insights into the details of radical generation. It is the first ribonucleotide reductase structure in which both the radical generating apparatus and the site of the thiyl radical can be seen. Currently, in a continued collaboration with the laboratory of Professor JoAnne Stubbe at MIT, the Drennan group is using crystallography to explore the complex allosteric regulation in the class II ribonucleotide reductases.

Since moving to MIT, Dr. Drennan has assembled a laboratory of bright and dedicated graduate students and postdoctoral fellows, and they have been incredibly productive. She and members of her research group, Dr. Tzanko Doukov and Dr. Tina Iverson, have solved the structure of a bifunctional acetyl CoA synthase which appeared in *Science* in October of this year. This protein, which was isolated from *Moorella thermoacetica* in the laboratory of Professor Stephen Ragsdale at the University of Nebraska, contains two components, one of which is a subunit with carbon-monoxide dehydrogenase activity that is structurally similar to the CO dehydrogenase she solved as a postdoctoral fellow. The other subunit is responsible for the assembly of acetyl CoA from carbon monoxide, a methyl group brought in by cobalamin, and coenzyme A. It is just the sort of problem she delights in solving: fraught with technical difficulties because the components contain complicated metal centers that are unstable and easily destroyed, and yet of central chemical importance.

In a letter supporting Dr. Drennan's nomination for the Schering-Plough Award, ASBMB member Rowena Matthews, G. Robert Greenberg Professor of Biological Chemistry at the University of Michigan, commented:

"Not only is she a talented scientist, but also is an outstanding speaker and an articulate writer. Before coming to graduate school, Dr. Drennan taught chemistry and drama at a Quaker school, and her love of drama is evident in her speaking and writing. Conveying crystallographic information also has aspects of art, and the images Dr. Drennan developed to describe her structure are objects of beauty as well as utility."

Dr. Ludwig, also a Professor of Biological Chemistry at the University of Michigan, stated:

"Dr. Drennan is extending her analyses of the CODH system with determinations of acetyl-CoA synthase, an a2b2 tetramer which incorporates CO dehydrogenase subunits along with distinct subunits containing a second Ni-Fe-S cluster that is the site of acetyl-CoA synthesis. The structure has been solved and this accomplishment fulfills my expectations that Dr. Drennan would successfully tackle structures even more complex than RNR and CODH.

"In addition, I want to emphasize Dr. Drennan's long-term commitment to training and teaching. As a graduate student she received awards for her outstanding teaching, and she has made a number of contributions as a member of the Education and Professional Development Committee of ASBMB. Her energy and direction helped the undergraduate poster session become a significant event at ASBMB meetings. At MIT she has challenged and inspired first-rate students and has gathered a group of bright and enthusiastic pre- and postdoctoral associates."

Thomas Landefeld Hailed as Mentor of Undergraduates

The Society for Advancement of Chicanos and Native Americans in Science (SACNAS) has presented its 2002 Undergraduate Institution Mentor Award to Thomas Landefeld, Associate Dean for Faculty Affairs and Scholarly Activities, California State University, Dominguez Hills.

The award honored Dr. Landefeld, a member of the ASBMB Minority Affairs Committee, for his involvement in and commitment to minority student programs, and the utilization of his research experience and knowledge of admissions and administration in mentoring minority students in the sciences.

Dr. Landefeld is also Director of Undergraduate Student Training in Academic Research and the Bridges to the Baccalaureate Degree Program at the Dominguez Hills institution. Following are excerpts from his address upon receiving the award at the SACNAS National Conference in September.

This award recognizes an aspect of what many of us in this room do routinely on a daily basis, and that is mentoring. I, like everyone, have had people in my life that have greatly affected my decisions, both professionally and personally, as good mentoring has to do. The mentoring of undergraduate students is even more significant, as one is able to have an influence on a person's life at a stage when, very often, direction is sought. For that reason, as nice as the plaque is for this award, the real reward lies in seeing the student successes and knowing that you may have contributed in some way to that success.

The fact that my peers are recognizing my contributions in this arena is particularly gratifying as these are individuals that I not only consider my mentors but also are individuals that I try to emulate in the area of mentoring.

Maybe most important, is the fact that this recognition is for something that I have a total commitment to and a true passion for. As such, the reward for doing it, is doing it. That is, the satisfaction lies in being able to do what is truly important to you whether someone else acknowledges it or not. And quite frankly, without a true compassion, most of what we do, and in particular efforts in this area, are just not effective.

To be recognized for anything, when you represent the unconventionality and the non-traditionalism, especially in the Academy, where tradition and almost unchanging ways, are truly the norm, is really special, as it sends a message to all those students that we do mentor that it is okay to be different, to follow the beat of your own drums. That has always been what I have been about and although it has, in many cases made things more difficult, in the end it is most satisfying as you have followed your principles and values which at the end of the day has to be what is really important in one's life.

Importantly, these battles not only occur in the academic establishment where we live, but also in the other parts of our lives. For example, I cannot even remember the number of times my family would ask "why would you risk your job (nice secure job) for issues affecting groups that you are not even part of." Well, in response, I can quote some excerpts from Carter G. Woodson in *The Miseducation of the Negro*, on the subject of whether someone of a different ethnicity can lead others; he states "one can if he is heart and soul with the people whom he serves." He goes on to say that the "incumbent has to take out the naturalization papers and identify himself as one of the group which he is trying to serve." And finally, perhaps most importantly, he states that "the real servant of the people must live among them, think with them, feel for them, and die for them."

Finally let me end on two other quotes from leaders that I have always greatly respected and whose values I have always tried to incorporate into my life and certainly into my mentor-

Dr. Thomas Landefeld at the SACNAS National Conference with some of the students he has been mentoring.

ing of students. In fact, if any of you have had occasion to call my home, you will usually find a quote from one of these great leaders on my answering machine.

The first is Dr. King, who among the many quotes he had, I believe that the one stating "The day we see the truth and fail to speak is the day we begin to die" is most significant to me. And, as for the other, I was most pleased to hear my close friend and colleague (and mentor) Dr. Talamantes, use a quote from Frederick Douglass, a person that I have also admired for his values and willingness to fight for what is right. The one that I will use is his statement, "Truth is proper and beautiful in all times and in all places." What better philosophies to use to mentor our students than these.

I thank you again for this award and commit to you that I will continue to do those things that earned me this recognition; I hope that all of you will do the same.

ELAM Program for Women in Leadership

The Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) Program for Women is now seeking applicants for its 2003-2004 class of approximately 45 Fellows. ELAM offers extensive educational, networking, and mentoring opportunities in support of women leaders who aspire to the highest administrative ranks at academic health centers.

The year-long curriculum mixes traditional executive seminars and workshops on topics pertinent to AHC management with group projects and individual assignments aimed at developing personal leadership. The program encompasses in-depth, case analyses, self-assessments, experiential learning, small group activities, and interactions with leaders in academic medicine and dentistry. The program culminates in a one-and-one-half day Forum on Emerging Issues, where program Fellows, their Deans and other invited guests gather with top experts to explore a timely, substantive issue facing AHC leaders. During the year, Fellows attend three educational sessions of five to seven days each; two at a suburban setting outside Philadelphia, held in the fall and spring, and one coinciding with the November annual meeting of the Association of American Medical Colleges. In addition, Fellows work on independent and group assignments between sessions.

Candidates must be at associate professor rank or higher, and must demonstrate significant administrative responsibilities and potential for advancement to top levels of academic administration. In addition to nomination from the Dean, candidates submit an application form and letters of recommendation from their supervisor and one other senior colleague. Submission deadline is February 1, 2003. Brochure and application details available on the ELAM web site at www.drexel.edu/elam.

For an application contact: Deidra Lyngard, Assistant Director, at 215-842-6041.

Science's Next Wave Adding New Features

Next Wave, a weekly electronic journal produced by the American Association for the Advancement of Science (AAAS) and *Science* magazine, is adding new features to its roster of resources for undergraduate, postgraduate, and post doctoral students.

Recently launched was the Minority Scientists Network, www.MiSciNet.org., which has two major emphases: supporting the Science, Math, and Engineering education of under-represented minority students on the undergraduate level, and encouraging those students to make transitions into graduate education. Published twice a month, the Minority Scientists Network covers student issues, mentoring issues and community involvement through a portal website, national meetings, and local activities. A variety of activities will also be conducted at the campus level to increase involvement.

Two more new features scheduled to be launched this fall are The Career Doctor and Industry Insider.

Access to Next Wave and its features is available through any individual computer for students whose institutions have purchased a campus-wide subscription to *Science's* Next Wave, www.nextwave.org, the premier weekly electronic journal dedicated to the career development of early career scientists. No passwords or log-ins are necessary as long as a campus computer is used. ASBMB provides free access to Next Wave to all active ASBMB members.

The site includes weekly news, alternative career profiles, discussion forums, academic career advice, and funding information, and serves as a gathering place for early career scientists and their mentors from around the world. Next Wave currently has country-specific home pages in the United States, Canada, the United Kingdom, Germany, Singapore, and the Netherlands, along with a variety of special-focus portals, including a new pan-European portal.

NIH Grant Helps Fund Biomedical Research Network In New Hampshire

The University of New Hampshire has received $5.6 million to stimulate biomedical research across the state. The New Hampshire Biomedical Research Infrastructure Network (NH-BRIN) established with the three-year grant is part of a national program to improve health-related research in states that have lacked the resources to compete effectively for federal dollars. NH-BRIN, at the university's Center for Structural Biology, is home to $1.5 million worth of instrumentation that has been procured with the grant. The instrumentation includes a robotic "picker and spotter" that can process nearly 400 protein samples in one session.

Funding for NH-BRIN comes from the National Centers for Research Resources at the National Institutes of Health.

"This is a grant that will have direct reverberations throughout the state," notes Dr. Vernon Reinhold, a UNH chemist and ASBMB member who directs NH-BRIN. "Its goal is to bring improved science understanding and capabilities to students and faculty members across the state—and ultimately to bring the best and brightest to UNH. This clearly should make our scientists more successful in acquiring national funding, and what better way to start than by supporting our undergraduate schools and providing established investigators with state-of-the-art instrumentation."

Drawing on the fields of chemistry, biochemistry, genetics, and molecular biology, NH-BRIN is fostering research on products of gene expression, its proteins, and how these fundamental components of life lead to cellular function. This understanding can have profound implications for human health and disease.

"The genome has been sequenced," explained Dr. Reinhold, "but that barrier to understanding cellular function was trivial compared to the problems that lie ahead. To produce effective therapies and medicines, protect against infectious diseases, and build the healthy society we all want and can afford, we must proceed to the last links between physiological function and molecular structure."

In his own research, Dr. Reinhold is collaborating with researchers around the world on projects relating to heart disease, gonorrhea, and the immunity-conferring properties of human milk, among others.

NH-BRIN is already supporting research projects at Dartmouth, Keene State College, and Plymouth State College, and is also working with New Hampshire Community Technical Colleges in Portsmouth and Concord, St. Anselm's College, and UNH-Manchester. Researchers and students at these schools can bring biological samples to UNH for analysis and tap into international databases to aid in structural identification.

Thanks to its high-speed, robotic equipment, UNH will ultimately have the capability of processing 200,000 samples of protein in a week.

UNH President Ann Weaver Hart noted that the grant provides a strong foundation in an area of research critically needed by New Hampshire. "This funding not only stimulates the research of existing faculty but also should make the university more competitive in attracting the best faculty and students in biomedical fields so vital to all areas of health-related research."

PRAT Fellowship Applications Due

The Pharmacology Research Associate (PRAT) Program of the National Institute of General Medical Sciences (NIGMS) sponsors postdoctoral fellows conducting research at the NIH in the pharmacological sciences. This can include research in the areas of signal transduction, drug metabolism, immunopharmacology, chemistry and drug design, structural biology, endocrinology, neuroscience, clinical pharmacology, among other areas. Potential fellows make an application together with a preceptor to the PRAT Program. Selected fellows receive a two-year appointment, salary, supplies and travel funds from the NIGMS to support research in the preceptors' laboratories. Candidates may apply prior to coming to NIH or FDA, or they may have started postdoctoral research at NIH or FDA within the 12-month period prior to the application receipt deadline. Applications are due on or before January 3, 2003 for fellowships starting in October of that year. Only U.S. citizens or permanent residents are eligible.

Contact the PRAT Program Assistant at (301) 594-3583 or prat@nigms.nih.gov to request a PRAT Fact Sheet and an application kit, or visit the NIGMS home page at http://www.nigms.nih.gov to view the PRAT Fact Sheet.

NHLBI Launches Innovative Proteomics Centers

The National Heart, Lung, and Blood Institute (NHLBI), part of NIH, has launched a major initiative to develop innovative proteomic technologies by creating 10 special centers of research, each funded for 7 years.

Each new center will focus on different novel technologies related to some aspect of healthy and diseased heart, lung, blood, and/or sleep processes. Ultimately, the research is expected to yield new and improved ways to diagnose and treat heart, lung, blood, and sleep disorders.

Altogether, the initiative will award a total of $157 million over 7 years, about $22 million of which has been awarded to fund the centers' first year.

"These awards take an important step beyond the science of gene research, which has accelerated in recent years and continues to make a huge impact on biomedical research," said NHLBI Director Dr. Claude Lenfant. "However, research at the level of the gene cannot provide a full picture of what's going on within a cell. These state-of-the-art centers will help supply that missing information and so advance biomedical research and clinical care."

"The new initiative provides the kind of sustained support needed for scientists to develop innovative technologies," said Dr. Susan Old, NHLBI Proteomic Program Administrator and Leader of the Institute's Bioengineering and Genomic Applications Scientific Research Group. "The centers also will be encouraged to share ideas and thus spur research even more. A special Web site about the program will be created to provide information about the centers' activities.

"NHLBI also plans to promote proteomic research by making products developed at the centers readily available to other scientists. These products include reagents, techniques, and basic information," continued Dr. Old. "This should speed the delivery of potential new clinical applications from research into practice."

Topics to be investigated by the centers include:

- Protein profiling, which quantifies a large number of different proteins in order to reveal molecular pathways.
- Post-translation modifications, which examine how modifying a protein's structure alters its function.
- Protein interactions, which look at how proteins interact with themselves and various cellular factors.

The 10 new NHLBI Proteomics Centers are:

- Three-D Proteomics and Aptemeric Arrays for Cystic Fibrosis at the Henry M. Jackson Foundation for the Advancement of Military Medicine, in Rockville, Maryland.
- Cardiovascular Proteomics Center at the Medical University of South Carolina in Charleston.
- Development of Novel Mass Spectrometry Tools for Individual Cell Proteome Analysis at the Medical College of Wisconsin in Milwaukee.
- NHLBI Proteomics Center at Yale University.
- NHLBI Proteomics Center at The Institute for Systems Biology in Seattle.
- Oxidative Protein Modifications in Cardiovascular Disease at Boston University.
- Proteomic Analysis of Blood Components in Autoimmune Disease at Stanford University.
- Proteomic Technologies to Study Airway Inflammation at the University of Texas Medical Branch at Galveston.
- Proteomics of Adaptation to Ischemia/Hypoxia in the Heart, Lung, and Blood at The Johns Hopkins University School of Medicine.
- Southwestern Center for Proteomics Research at the University of Texas Southwestern Medical Center in Dallas.

NIH Releases New Curriculum Supplements

NIH has released three new curriculum supplements to bring the latest findings on the brain, environmental health, and oral health to students across the nation. These instructional materials are part of a project that promotes inquiry-based, interdisciplinary learning in kindergarten through grade 12, and NIH is distributing the modules to teachers free-of-charge.

The new curricula are aligned with the National Science Education Standards released by the National Academy of Sciences. Each supplement comes with an interactive CD-ROM.

The Brain: Understanding Neurobiology Through the Study of Addiction allows students in grades 9 through 12 to explore how drugs alter brain function by changing the way neurons communicate.

Chemicals, the Environment, and You: Explorations in Science and Human Health enables students in grades 7 and 8 to explore the relationship between chemicals in the environment and human health, utilizing basic concepts in the science of toxicology.

Open Wide and Trek Inside encourages students in grades 1 and 2 to explore the wonders of the mouth as a living environment and learn major scientific concepts relating to oral health.

For more information or review copies, contact: Dr. David Vannier, Professional Development Coordinator, OSE, NIH 6705 Rockledge Dr, RM 700, Bethesda, MD 20892-7984; Ph: 301-496-8741; Fx: 301-402-3034, Email: vannierd@od.nih.gov.

ASBMB Member Receives Rolex Award For Innovative Salt Water Farming

Dr. Gordon Sato, an ASBMB member, received the Rolex Award for Enterprise in Tokyo, Japan. He is one of five international winners of the $100,000 award who were honored October 23 at an awards ceremony in Tokyo. Dr. Sato was recognized for his work in creating a new way to farm in the salty water off the coast of Eritrea in Africa.

"I always had the idea that I could use science to improve the quality of life for people in poor countries, and I could do something about poverty and hunger," he said.

Dr. Sato, a noted 74-year-old cell biologist who taught at Brandeis University from 1958 to 1969 and retired to Wenham in 1991, became interested in helping the people of Eritrea in the 1980s, after learning of the country's struggle with famine. Since his retirement, he has spent hundreds of thousands of dollars of his own money helping Eritreans by developing sustainable ways for them to feed themselves.

Many Eritreans raise livestock for food, but the waves of droughts that continue to afflict the region greatly reduce the grazing area available. Mangrove trees, Dr. Sato thought, which thrive in the intertidal zones of salty water along the coast, could provide leaves for livestock to eat, but the trees only grow in a few distinct areas of the 1,000-mile coast.

He saw no reason that the trees should be restricted to one area over another. Working with Eritrean students, he discovered that the water where the mangroves grow is rich in nitrogen, phosphorus and iron, brought down from the mountains on the few days a year when fresh water flows to the shore. Mangrove-free zones have almost none of these crucial nutrients.

''The whole empty coast could be filled with trees if we gave them nitrogen, phosphorus and iron. And we did that (in one village), and they're growing beautifully," he stated.

Within the past two years, Dr. Sato has planted 200,000 trees, hiring locals, mostly women, to run the project. He plans to expand to 500,000 trees this coming year. So far, there's been enthusiastic support in the village, and the villagers' goats and sheep have quickly taken to a new diet of mangrove leaves. He theorizes that about 100 trees are needed to support one livestock animal.

"We solved the problem of why trees don't grow there, and how we can get them to grow where we want them to grow," said Dr. Sato. "That's partly the beauty of it. It's so simple, but it's new, and it has big practical impact. We can feed this village."

Dr. Neil DeGrasse Tyson, an astrophysicist and Director of the Hayden Planetarium in New York City, and a judge on the Rolex panel said, ''I liked that Dr. Sato is an academic who has turned his formidable legacy as a biologist into a new legacy—one helping people most in need. He's taking fundamentals that we know about soil, water, and minerals, and developing a new solution. It should be the envy of any nation's attempt to try to feed its hungry."

UW Biochemist Receives Award for Research on Vitamin K

John W. Suttie, Professor of Biochemistry at the University of Wisconsin-Madison, has been selected to receive the Bristol-Myers Squibb/Mead Johnson Award for Distinguished Achievement in Nutrition Research in honor of work that defined the molecular action of vitamin K.

Dr. Suttie, an ASBMB member since 1967, is Katherine Berns Van Donk Steenbock Professor in Nutrition in the University's Department of Biochemistry, and serves as Director of the Center for Coagulation Research. He is also a member of the affiliate faculty of UW-Madison's Institute on Aging and Adult Life. Dr. Suttie joined the faculty in 1961, and from 1988-97 served as Chair of the Department of Nutritional Sciences. He was elected to the National Academy of Sciences in 1996.

Dr. John W. Suttie

His work proved that the production of active prothrombin, one of the blood clotting proteins, involved the vitamin K-dependent carboxylation of a precursor protein.

"John Suttie has been the standard bearer for vitamin K," says Robert A. Burns, Research Fellow, Global Research and Development, Mead Johnson Nutritionals, a subsidiary of Bristol-Myers Squibb Company. "His 'post-translational precursor modification' hypothesis, which ran counter to popular beliefs, accelerated the pace of research in the field and has been a landmark in nutrition research."

The Bristol-Myers Squibb Unrestricted Biomedical Research Grants Program that provides the Nutrition Award was initiated in 1977. The program has awarded $100 million in no-strings-attached funding in six biomedical research areas, including cancer, cardiovascular, infectious diseases, metabolic diseases, neuroscience and nutrition. The Distinguished Achievement Award of $50,000 is awarded annually in each of the six categories and is based on peer review.

Dr. Suttie received his award at a dinner held in his honor October 10.

AAAS Elects ASBMB Members as Fellows

Twenty-three ASBMB members have been elected Fellows of the American Association for the Advancement of Science. They will be among 291 new Fellows who will be recognized for their contributions to science at the Fellows Forum to be held on February 15, 2003 during the AAAS Annual Meeting in Denver. Listed below by section affiliation, the ASBMB members are:

Biological Sciences

Judy Callis, University of California, Davis; Helen C. Davies, University of Pennsylvania; Carol A. Gross, University of California, San Francisco; Philip Leder, Harvard Medical School; Joachim Messing, Rutgers University; Jeffrey W. Roberts, Cornell University; Robert Schleif, Johns Hopkins University; James N. Siedow, Duke University; Alexander J. Varshavsky, California Institute of Technology; Elizabeth Vierling, University of Arizona; Richard D. Vierstra, University of Wisconsin, Madison; Andrew Wright, Tufts University Medical School; and Keith R. Yamamoto, University of California, San Francisco.

Chemistry

Richard Neil Armstrong, Vanderbilt University; Angela M. Gronenborn, National Institute of Diabetes and Digestive and Kidney Diseases; Susan H. Hixson, National Science Foundation; Laura L. Kiessling, University of Wisconsin, Madison; and Maria Tomasz, CUNY-Hunter College.

Medical Sciences

Richard J. Courtney, Pennsylvania State University College of Medicine; Eric Hunter, University of Alabama, Birmingham; Timothy James Ley, Washington University College of Medicine; Dennis J. O'Callaghan, Louisiana State University; and Owen M. Rennert, National Institute of Child Health and Human Development.

Robert Bittman to Receive

Robert Bittman, Distinguished Professor of Chemistry and Biochemistry at Queens College and the Graduate School of the City University of New York and an ASBMB member, has been selected to receive the 2003 Avanti Award in Lipids. The Award recognizes outstanding research contributions in the area of lipids. Recipients of the Avanti Award in the past five years were Lewis Cantley, Richard Epand, Edward A. Dennis, Ronald N. McElhaney, and Christian R.H. Raetz. The Award consists of a plaque, stipend, and transportation and expenses to the 2003 ASBMB Annual Meeting, where Dr. Bittman will deliver a lecture on Tuesday, April 15, at 8:30 a.m.

The awardee received his Ph.D. in Chemistry at the University of California, Berkeley, under the direction of Prof. Andrew Streitwieser, Jr. In 1965-66, he was a postdoctoral fellow in Dr. Manfred Eigen's laboratory at the Max-Planck-Institute in Göttingen, Germany, where he used fast kinetic methods to study the mechanism of NAD+ binding to an allosteric enzyme.

ASBMB member Sanda Clejan, Professor of Pathology and Biochemistry and Director, Core Laboratories, Tulane University, who received her Ph.D. in Biochemistry under Dr. Bittman's mentorship and nominated Dr. Bittman for the Avanti Award, said "it was very hard to write only two pages for the Summary of his Scientific Achievements." Among his achievements, she noted that he was in the first group of those selected by NIH in June 1986 to receive the MERIT Award. In announcing the MERIT Award, Dr. Claude Lenfant, Director of the National Heart, Lung, and Blood Institute, wrote that "for more than a decade Dr. Bittman's research has contributed significantly to critical investigation of the structural properties of membranes at the molecular level. Particularly noteworthy are [his] studies of how properties of biomembranes are controlled by their constituent lipids."

Dr. Robert Bittman

Gabor Tigyi, Professor of Physiology at the University of Tennessee Health Sciences Center and also an ASBMB member, wrote in support of the nomination, "He has set new standards in the synthesis of bioactive lipids and their analogs and has done this with ingenuity and elegance. His synthetic schemes have benefited basic researchers and industrial chemists alike." Dr. Tigyi also praised Dr. Bittman as "an excellent teacher. He has trained over 20 post-doctoral and 18 Ph.D. students, all of whom have moved on to important positions in the field."

Scientific Achievements

The main thrust of Dr. Bittman's work has been to examine selective interactions among membrane lipids and proteins, as well as the role of cholesterol in membranes. In general, this has been achieved at the molecular level by synthesizing unnatural lipids (sphingolipids, glycerolipids, and sterols) and applying these analogs to structure-function studies in a variety of membrane models. The following outlines some highlights of Dr. Bittman's research.

In early work his laboratory showed that cholesterol reduced the rate of water permeability of bilayers in the liquid-crystalline phase and enhanced it in the gel phase, i.e., cholesterol buffered permeability behavior. His laboratory showed that although the cholesterol hydroxy group is located at the hydrophilic/hydrophobic interface, this group does not interact specifically with the ester carbonyl oxygens of phospholipids. He demonstrated this by synthesizing ether-linked glycerophospholipids and showing that the cholesterol-induced modulation of the molecular motion of the phospholipid hydrocarbon chains occurs equally well in ether-linked lipids as in the analogous ester-linked molecules. Later his laboratory used synthetic analogs of cholesterol to show that cholesterol's isooctyl side chain is the perfect length for optimal interaction with phospholipids.

Dr. Bittman's early work detailed stopped-flow and equilibrium studies of the binding of polyene macrolide antibiotics (filipin, amphotericin B, and nystatin) to sterols (ergosterol vs. cholesterol) in model membranes contributed to the widespread use of filipin as a cytochemical probe of cholesterol. These sterol-binding data also spurred pharmaceutical interest in this class of antifungal antibiotics, ultimately resulting in the advent of liposomal formulations of amphotericin and nystatin (the current market value of which exceeds $500 million annually). He and his coworkers also used filipin to estimate the transbilayer distribution of sterols in mycoplasma cell membranes, and examined the effects of other lipids and proteins on the ratio of sterols in the outer vs. inner leaflet of the bilayer. Recently, he has studied the properties of other specific cholesterol-binding agents such as cyclodextrins and bacterial cytolysins.

Dr. Bittman and his co-workers showed that the rate of spontaneous desorption of labeled radiocholesterol from the donor membrane of vesicles is retarded dramatically by the interaction of cholesterol with sphingomyelin and is enhanced by membrane curvature and bilayer defects. These studies

Avanti Award in Lipids

led to his synthesis of sphingomyelin and phosphatidylcholine having the same hydrocarbon chains, allowing a direct comparison of their interaction with cholesterol. A preferential interaction of sphingomyelin with cholesterol was found, which led to an analysis of the molecular features in sphingomyelin required for the tight interactions with cholesterol in monolayers and bilayers. Replacing the NHCOR group with an OCOR group revealed the importance of the NH site in this lipid-lipid interaction. It is now known that these two lipids are enriched in specialized domains called rafts, which float in a sea of glycerolipids in the liquid-crystalline phase and contribute to a wide variety of physiological functions. Indeed, Dr. Bittman's extensive studies of cholesterol-sphingomyelin interactions in bilayers were influential in the recent proposals of the formation of sphingolipid- and cholesterol-rich membrane raft microdomains.

Dr. Bittman and his co-workers also synthesized various unnatural sphingolipids to examine the molecular determinants in the fusion of Semliki Forest and Sindbis viruses with target membranes (large unilamellar vesicles). In a collaborative effort with Professor Jan Wilschut at the University of Groningen, he showed that for fusion of these alphaviruses the sphingolipid has mostly a cofactor role (rather than an overall membrane-ordering role); a stereospecific recognition is involved in the sphingolipid; the trans C4-C5 double bond in the sphingoid base, the C3-hydroxy group, and the carboxamide group are critical sites. However, the presence of lipid rafts is not required for the pH-dependent fusion of these viruses to membranes.

The new analogs of sphingolipids synthesized in his laboratory have been used by collaborators to examine some of the molecular features needed for regulation of processes involving cell growth and cell death. Thus Dr. Bittman's research on unnatural sphingolipids has contributed to the realization that sphingolipids are central participants in the life of cells.

The awardee's recent work has contributed to the development of new competitive antagonists of lysophosphatidic acid receptors and new ether lipids as novel anticancer agents that are incorporated into membranes and disrupt signal transduction pathways in tumor cells.

Education in the Molecular Life Sciences: The Central Role of Biochemistry and Molecular Biology Satellite Meeting

July 18-20, 2003*
University of Toronto, Canada

Organized by: J. Ellis Bell, University of Richmond and Jeanne Narum, PKAL

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Plans for Assessing the Impact of Innovation in Education

*To be held immediately prior to International Congress of Biochemistry and Molecular Biology, July 20-24, 2003, Toronto IUBMB Congress website: http://www.iubmb2003.org

For further information contact:
Dr. Ellis Bell: jbell2@richmond.edu or the
ASBMB, 9650 Rockville Pike, Bethesda, MD 20814
Tel: 301-634-7145; Fax: 301-634-7126; Email: kgull@asbmb.faseb.org
Meeting website: http://www.richmond.edu/~jbell2/iubmb-satellite.html

The Health Sciences Centre at the University of Alberta. At left is the University Hospital which has 700 beds), the center building is the Basic Medical Sciences building where the Department of Biochemistry is located, and the building on the right is the Heritage Medical Research Centre where the MCBL is located.

One of Canada's Finest:

"Our vision is to be indisputably recognized in teaching, research and community service, nationally and internationally, as one of Canada's finest universities and amongst a handful of the world's best," said University of Alberta President Roderick D. Fraser, in his statement for the Institution's 2001/2002 Annual Report.

Located in Edmonton, the university provides an atmosphere in which individuals can develop to their full potential. It has the lead, by a wide margin, on all Canadian universities, in the number of 3M Teaching Fellowships awarded, 23.

In research, as well as in teaching, the university serves the community. Policy changes on acid emissions and legislation controlling phosphorus in soaps and detergents that affect the quality of our environment, owe much to the work of Dr. David Schindler, recent winner of the Gerhard Herzberg Gold Medal, the highest honor for Canadian researchers. Another example is the ongoing tremendous work in Islet Cell Transplantation, an effective treatment for those suffering from Type 1 diabetes. The university is also highly regarded for its biomedical research which has been greatly facilitated by personnel funding from the Alberta Heritage Foundation for Medical Research.

Nanotechnology

Of particular importance is the establishment of the National Institute of Nanotechnology (NINT). In partnership with the Canadian federal government through the National Research Council and the provincial government, the University is now home to this institute, in which this new technology allows researchers to manipulate individual atoms and molecules. NINT, according to Dr. Fraser, will position Canada to play a leading role in a field expected to have an economic impact of $1 trillion (Canadian) per year in the next 10-15 years. Nanotechnology will affect the lives of all, with advances in health, computing science, energy, biotechnology, education, manufacturing and engineering.

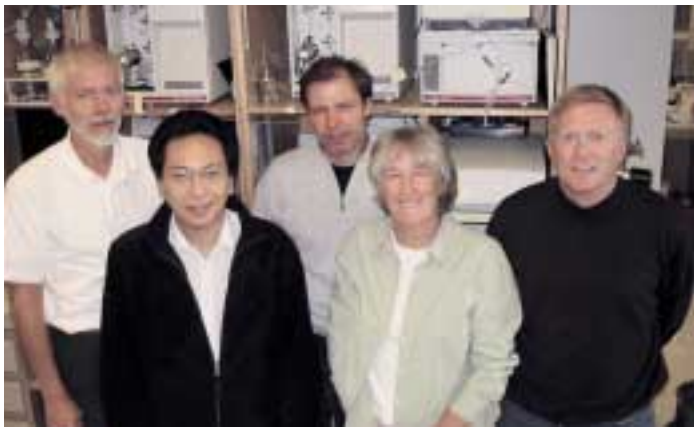
University of Alberta President Roderick D. Fraser

While NINT will be of tremendous value in building a diversified Albertan and Canadian economy in the future, the university continues to foster this economic development through 76 new companies born of university knowledge since 1963, with active ones currently employing more than 1,000 highly qualified personnel.

Molecular and Cell Biology of Lipids

Among the strengths of the University of Alberta is the Group on the Molecular and Cell Biology of Lipids (MCBL). The MCBL is internationally renowned for its research on molecular regulation of genes involved in lipid homeostasis, biochemistry of lipid-protein interactions, lipid compartmentalization and intracellular trafficking, and lipid homeostasis in murine models. The five labs in the MCBL are located contiguously on the third floor of the Heritage Medical Research Centre. The close proximity of the labs enhances synergism and collaboration among the five faculty members and trainees in the MCBL. The MCBL has a weekly Journal Club, research presentations and an active seminar program. Research conducted by the MCBL is supported by grants from the Canadian Institutes of Health Research, the Heart and Stroke Foundations of Canada and Alberta, the Alberta Heritage Foundation for Medical Research and several pharmaceutical firms.

The group is lead by Dr. Dennis Vance who holds the Canada Research Chair in Molecular and Cell Biology of Lipids. Dr. Vance, a member of ASBMB since 1977, is internationally recognized for his contributions to understanding the regulation of phosphatidylcholine biosynthesis in mammals and the function of phosphatidylcholine biosynthesis in secretion of very low density lipoproteins from the liver. Other members of the group are:



Faculty members in the Molecular and Cell Biology of Lipids Group are, from left to right, Dr. Dennis Vance, Dr. Lou Agellon, Dr. Richard Lehner, Dr. Jean Vance, and Dr. Gordon Francis.

The University of Alberta

Dr. Jean Vance is a member of the Editorial Board of the *Journal of Biological Chemistry* and will organize the 2005 Gordon Conference on the Molecular and Cellular Biology of Lipids. Her work focuses on regulation of phosphatidylserine biosynthesis and intracellular lipid transport. She is also known for her research on very low density lipoprotein assembly and secretion, and lipid biosynthesis and transport in primary neurons.

In addition to their research contributions, the Vances are the editors of an advanced textbook, *Biochemistry of Lipids, Lipoproteins and Membranes*. The fourth edition of this book was published in October of this year.

Dr. Lou Agellon, a pioneer in research on the use of genetically modified mice to understand the function and metabolism of sterols in the liver and metabolism of lipids in the enterohepatic circulation, joined MCBL in 1993. He says the major research challenges for this decade include "how metabolic pathways are integrated into the whole organism."

Dr. Gordon Francis is an endocrinologist who moved to the University of Alberta in 1994. His research training was with Doctors Ed Bierman, Jack Oram and Jay Heineke at the University of Washington. He and Dr. Oram discovered in 1994 that patients with Tangier's disease have a defect in formation of high density lipoproteins due to a defect in cholesterol and phospholipid efflux. Dr. Francis continues to conduct research on cellular lipid efflux and the role of tyrosylated high density lipoproteins and apolipoproteins in HDL formation and atherosclerosis.

Dr. Richard Lehner joined MCBL in 1999. His expertise is in triacylglycerol metabolism. He purified an intracellular triacylglycerol hydrolase that is involved in mobilization of triacylglycerol in liver and adipose tissue. Dr. Lehner's thoughts about the challenges of research in the next decade are "the discovery of new pharmacological targets leading to the development of therapies for cardiovascular disease, obesity and diabetes."

The University's Biochemistry Department

The roots of the university's Department of Biochemistry go back to the arrival of Dr. James B. Collip in Edmonton in 1915. Dr. Collip had a Ph.D. in Biochemistry from the University of Toronto, and came to join the first professor of Physiology and Pharmacology at the University of Alberta, Dr. Heber H. Moshier. Dr. Collip went on to become involved in the discovery of insulin while on a one-year sabbatical at the University of Toronto in 1921.

The Department has 28 faculty members whose research covers a broad spectrum of topics, including nucleic acid-protein interactions, regulation of gene expression, structure and function of proteins, receptors, muscle biochemistry, mechanisms of enzyme catalysis, metabolic regulation, lipid homeostasis and the structure, function and assembly of biological membranes.

Agencies such as the Canadian Institutes for Health Research (CIHR), the Canadian Heart Foundation, the National Cancer Institute (NCI), and the Alberta Heritage Foundation for Medical Research (AHFMR) provide funding in the form of major equipment grants, graduate studentships, fellowships, scholarships and establishment grants for new investigators. This funding amounts to over $10 million (Canadian) per year.

The Department of Biochemistry is a division of the Faculty of Medicine, and is located on two and one-half floors (57,603 sq. feet) of the Medical Sciences Building (MSB). The building also houses the Departments of Cell Biology and Anatomy, Medical Microbiology and Immunology, Laboratory Medicine & Pathology, Pharmacology and Physiology.

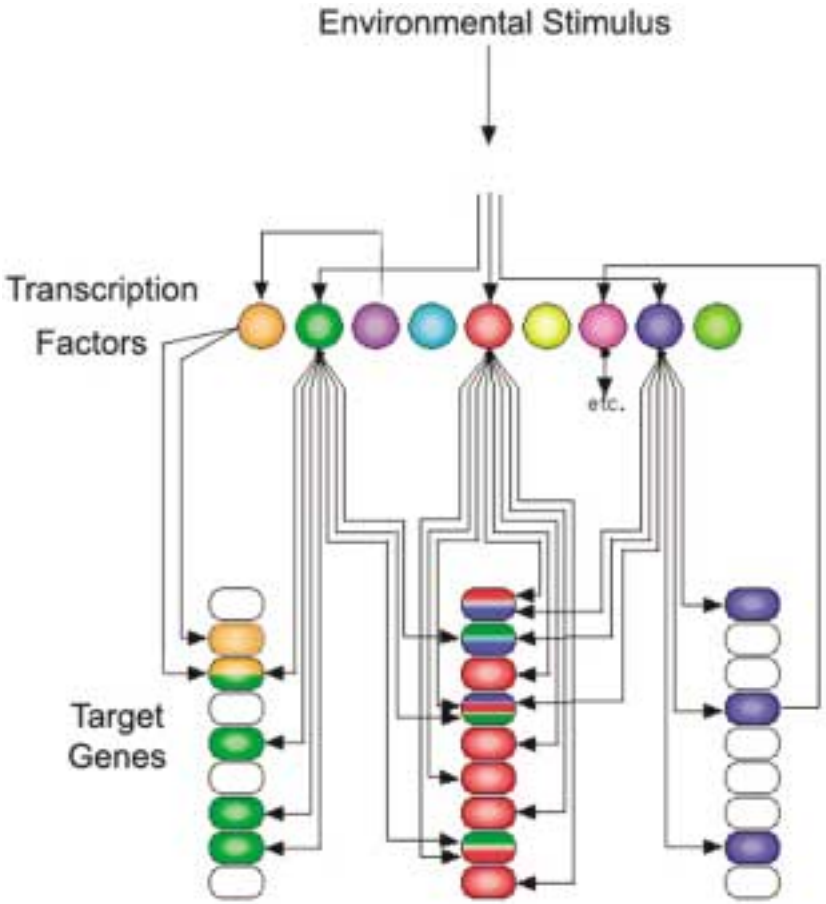
Scientists Produce

Imagine popping a movie into the VCR or DVD player and watching a list of credits for two hours—no movie, no plot, no dialogue—just the cast. That's the problem facing contemporary biology. The human genome project has provided researchers with a growing list of genes—basically a cast of thousands of characters, running life inside the cell.

But the key to understanding life, both in sickness and in health, is the script that outlines how these cellular players interact, communicate, and cue each other. In healthy cells, genes and the proteins they produce interact harmoniously to carry out vital life functions. When signals are botched and genes miss their cues, the result is disease.

ASBMB member Dr. Richard Young at the Whitehead Institute for Biomedical Research, Dr. David Gifford at the Massachusetts Institute of Technology, and colleagues, have developed the first comprehensive script describing how the yeast genome produces life.

Whitehead's Dr. Richard Young (left) and MIT Professor of Computer Science David Gifford illustrate the synergy generated by interdisciplinary research.



credit: Dr. Richard Young

The expression of thousands of genes (blue) is controlled by combinations of hundreds of transcription factors (colored shapes). Transcription factors read a cell's script and perform as lead actors to cue the production of necessary proteins, by binding to the promoter region (colored boxes) of specific genes (top three genes). When a transcription factor fails, the corresponding protein can't be produced (bottom three genes) and results in disease.

The researchers identified how the leading players, transcription factors, coordinate the action of all other genes in a living cell. "In the whole history of biology to date, we've come to understand gene regulation for only a few dozen genes. In the next few years, this new technology will allow us to unravel gene regulation across the entire genome of any organism, and thus the script underlying fundamental life processes," said Dr. Young.

"The implications for human health could be immense," he added. "The whole is so much more than the sum of the parts. Knowing how the key players work together in a healthy cell gives us an entirely new way of looking at all diseases and new targeted approaches to developing therapeutics and vaccines."

Until now unraveling the complex relationships between genes and proteins was a painstakingly long and tedious process, involving years of individual biochemical and molecular experiments. Advanced high-throughput biological and computing technologies provide a way to script these relationships in a global fashion and allow researchers to do in weeks what would have taken years to achieve.

the Script for Life

"A key hurdle we had to overcome was assembling snippets of conversation between genes into a coherent script. We developed new computational techniques, which allowed us to discover the script, visualize it over time, and to check it for accuracy," explained Dr. Gifford.

"This study makes a significant contribution to understanding the fundamental organizing principles of life," said James Anderson, Program Director at the National Institute of General Medical Sciences. "It also amply illustrates the synergy that can be generated by biologists and computational experts working together to tackle a systems-level research problem. We are fortunate indeed that such collaborations are becoming more common and that cultural and institutional barriers to such collaborations are beginning to give way."

Transcription Factors Take the Lead

Genomes contain two codes. One, discovered and elucidated over the last 50 years, is biology's central dogma: genes, composed of DNA sequences, specify how proteins are made. But what determines the types and amounts of the various proteins that characterize a particular cell type, be it a skin cell or a blood cell? The genome also specifies the screenplay that coordinates the production of these proteins, and, in turn, how living cells develop and respond to changes in environment.

Special proteins called transcription factors read a cell's script and perform as lead actors to cue the production of necessary proteins, including the transcription factors themselves, by binding to specific genes. This process, called gene expression, is the basis for all cellular functions, and is highly complicated even in the simplest of cells.

Dr. Young's group used a technique called genome-wide location analysis, developed in their lab, to analyze the binding of most of the known transcription factors for baker's yeast.

The method is based on DNA microarray technology, which displays ordered segments of DNA and provides researchers with a compact format to quickly analyze how proteins interact with the DNA of an entire genome.

Of the 141 transcription factors known for baker's yeast, Dr. Young and his colleagues observed that 106 bound to about 2,300 locations in the genome, representing about 37 percent of the yeast's known genes. The picture is complex, because a transcription factor can bind to more than one gene, and one gene can bind to more than one transcription factor.

The remaining 35 transcription factors were undetectable under current experimental conditions. Many of the other genes come into play under less typical environmental conditions such as heat, interactions the group is now studying. In addition, some protein-gene binding events were eliminated by the group's stringent statistical requirements.

Whereas earlier work required approximately 300 researcher-years to find just some of the binding sites of only one transcription factor (Gal4), the present experiment needed only about a researcher-week for each of the yeast's hundred-some regulatory proteins. "Without this increase in productivity, we just wouldn't be able to create a comprehensive view of the how the genes in the cell are controlled," Dr. Young says.

Knowing how the key players work together in a healthy cell gives us an entirely new way of looking at all diseases.

Missed Cues Lead to Disease

The result is a vast network of the interactions between proteins and genes, a complex script that specifies the roles of all the players involved in a cell's life. Each transcription factor was tied to a group of "supporting actors" it controlled—additional genes involved in cell growth, metabolism, or environmental response.

Understanding how biological processes are regulated on a whole-genome scale will help in developing targeted pharmaceutical approaches. For instance, identifying the control mechanism underlying how a cell knows when to divide is key to finding out what goes wrong in diseases such as cancer, where cells divide uncontrollably.

"The pharmaceutical industry is based on therapeutics developed for correcting faulty protein products, which result from breakdowns in metabolic pathways. A new area of pharmaceutical industry will develop based on drugs targeting breakdowns in genome regulatory networks. Perhaps we can correct some problems even before a faulty protein is produced," predicts Dr. Young.

The group is already working on doing the same analysis for the human genome, whose regulatory network consists of about 1,700 transcription factors. Although high quality sequence data currently exist for about a third of the human genome, about 95 percent of it should be available next spring.

by John D. Thompson, Editor

Biotech Companies Find Financing Getting Scarce

Just over a year ago, it was the company that made headlines by flying sheets of human skin cells from Southern California to Washington to help in treatment of people severely burned in the September 11 terrorist attack on the Pentagon. But in October of this year it filed filed for bankruptcy.

The company is Advanced Tissue Sciences, and while it was a biotech star with little or no trouble getting financing in 2000 and 2001, now it is just another biotechnology firm on the ropes and in need of funds. Advanced Tissue Sciences is not alone in this predicament. According to Merrill Lynch about 35% of publicly traded biotechnology companies have less that 35% of the cash needed to meet their current levels of spending. And according to BioCentury, a biotech business newsletter, at least 45 biotechnology companies in the U.S. and Europe have, in the last half of this year, reduced staff sizes or made other cutubacks, and 62 have less than a year's worth of cash on hand.

Compounding the problem, as of November the Nasdaq biotechnology index was down by nearly half since the beginning of the year, a decline that makes it nearly impossible for cash-hungry biotech firms to raise money in the stock market. Many skeptics doubt that next year will be much better. The public-financing window "is closed and triple-locked," according to Louis Lavigne, CFO at Genentech.

Still, some biotech investors argue that this concern is overdone. "Companies are still in reasonable shape," Dennis Purcell, a fund manager for the Perseus-Soros Biopharmaceutical Fund in New York, told BioCentury. He saw any financial crunch as not likely to occur until late next year.

All biotechs don't suffer equally during downturns, of course. Giants such as Genentech and Amgen are more than capable of weathering a downturn in the markets and a handful of mid-size biotechnology firms are poised to make the jump to profitability on the strength of recently introduced drugs. One of those firms, Scios, Mountain View, Calif., even made plans to raise $125 million in a convertible-note offering after announcing better-than-expected sales of its recently introduced heart drug, Natrecor.

Top London Colleges Consider Merger to Form Research Giant

London's two largest research institutions have revealed that they are considering plans to merge. University College London (UCL) and Imperial College say that they are discussing the move in a bid to compete more effectively with top U.S. institutions.

If the merger happens, it will create a university with 28,000 students and almost $620 million in yearly research funds — far more than Oxford or Cambridge, which will each spend about $338 million on research this year. A decision to merge could be made as early as December, with the new institution taking its first steps by this time next year.

The possible merger is a "once-in-a-lifetime opportunity," said Derek Roberts, Provost of UCL. "We're talking about creating the world's leading university, full stop. We see this as an institution not for the next two or three years but for two or three centuries."

Richard Sykes, Rector of Imperial College, said that both colleges are embarking on a consultation exercise "to ensure that if the merger does go ahead we carry most people with us". If it does happen, the new body is likely to leave the loosely federated University of London.

Bioterror Drug on Fast Track

Some of the money Congress poured into biodefense last year will trickle down to Palo Alto, California-based Anacor Pharmaceuticals which received a $21.6 million, three-year contract to develop a new antibiotic designed to spay and neuter anthrax and other bacterial infections.

The contract, issued by the Defense Advanced Research Projects Agency (DADRPA) is the latest example of how military and industrial leaders are trying to accelerate the pace of biotech development to meet the perceived threat of bioterror. The contract calls for Anacor to get one antibiotic fully tested as a bioterror treatment, and to have in development an improved version of the first drug.

Pfizer Settles Suit for $49 Million; Overcharging Medicare Alleged

Pfizer Inc. will pay $49 million to settle Justice Department allegations that it overcharged the Medicaid program for its cholesterol-lowering drug Lipitor. The settlement will be split between the federal government and the states because Medicaid is a jointly funded program.

The charges stemmed from a whistleblower lawsuit alleging that educational grants by Parke-Davis to the Ochsner Health Plan in 1999 constituted a rebate that lowered the price of the drug for the Louisiana insurer. Federal law requires drug companies to offer the Medicaid program the lowest price paid by any purchaser. Pfizer acquired Parke-Davis through its 2000 takeover of Warner-Lambert.

Pfizer also said it had entered into a corporate integrity agreement with the Office of the Inspector General of the Department of Health and Human Services to make sure its policies comply with pricing regulations. Pfizer spokeswoman Mariann Caprino said the company already has a compliance program, but the new arrangement would require enhancing some procedures. She declined to elaborate.

Exelixis and GlaxoSmithKline Form Broad Alliance

Exelixis, Inc. and GlaxoSmithKline plc (GSK) have announced that they will form a broad alliance to discover, develop and commercialize novel therapeutics in the areas of vascular biology, inflammatory disease and oncology. The alliance combines Exelixis' powerful gene-to-drug discovery platform and GSK's strengths in development and commercialization by means of an innovative model for sharing risks and potential rewards in a research and development collaboration.

Under the terms of the agreement, Exelixis will have responsibility for the delivery to GSK of an undisclosed number of small-molecule compounds that have met agreed-upon criteria in early Phase II clinical testing. GSK will have the right to further develop these compounds and exclusive, worldwide commercialization and manufacturing rights. Exelixis retains co-promotion rights in North America.

GSK will make an upfront payment of $30 million to Exelixis. GSK will also initially acquire two million newly issued shares of Exelixis common stock at $7 per share. Over the initial six years of the agreement, GSK will provide Exelixis with a minimum of $90 million in development funding.

UK Biotech Firms May Merge for Cancer Research

A group of Britain's biggest biotech companies have held tentative talks about combining to form a cancer company capable of competing with the biggest firms in the world.

The talks, involving cancer specialists Xenova, Antisoma, British Biotech, KS Biomedix, and Oxford GlycoSciences, are understood to have the backing of Amvescap, a big institutional investor that holds shares in all of the firms.

Investors are said to be pushing for the merger as a way to restore value to biotech stock prices after a period of decline. However, attempts at consolidation in the British biotech sector have traditionally stumbled because of the competing aims and egos of the founder chairmen who typically control the groups.

Sealing a five-way merger between the groups may prove too onerous a task even for some of the investment bankers who are pushing for the fee-generating deal to take place.

A source close to one of the companies told the *Manchester Guardian*, "It's a great idea in principle and one that has been knocking around the industry for 18 months but a deal is unlikely in the short-term."

The Impact of Ethics on Research

By Frederick Grinnell

From the *Chronicle of Higher Education*, October 4, 2002

A recent report from the Institute of Medicine gives academe and government a new opportunity to think and act differently about promoting integrity in scientific research.

Speaking as a member of the IOM committee responsible for the report (although not representing either the committee or the institute), I believe that we now can change the entire tone of the discussion about the conduct of science.

In the past, scientists and policy makers have asked questions that are basically negative: What is misconduct? How can it be prevented? What should be done to protect whistleblowers and to provide due process to researchers accused of misconduct? The new report, in contrast, raises positive questions: What is integrity? How do we find out if we have it? How can we encourage it?

Many scientists have found it difficult to invest much energy in the negative goal of preventing research misconduct. Almost every researcher considers misconduct to be pathological and destructive behavior, but also very rare.

At the same time, as I noted in an earlier essay in the *Chronicle* ("The Practice of Science at the Edge of Knowledge," *The Review*, March 24, 2000), the everyday practice of science can be remarkably ambiguous. In the words of the National Academies' 1992 report "Responsible Science," sometimes "the boundary between fabrication and creative insight may not be obvious."

For instance, when it comes to distinguishing data from experimental noise, heuristic principles can be helpful, but an investigator's experience and intuition — in short, his or her creative insight — will determine the final interpretation. To some, the selection of results might appear arbitrary and self-serving, or even an example of misconduct. The case of the Nobel Laureate Robert A. Millikan, who selected 58 out of 140 oil drops from which he calculated the value of the charge of the electron, provokes precisely that kind of debate.

Not only is data selection a common and necessary feature of much science, but also articles announcing a scientific discovery typically do not describe what actually happened during the research. Instead, as the Nobel Laureate Francois Jacob wrote in The Statue Within: An Autobiography, "writing a paper is to substitute order for the disorder and agitation that animate life in the laboratory ... to replace the real order of events and discoveries by what appears as the logical order, the one that should have been followed if the conclusions were known from the start." That reconstruction of reality into a presentation of discovery according to the inductive format provoked the Nobel Laureate Peter B. Medawar to write his essay "Is the Scientific Paper a Fraud?"

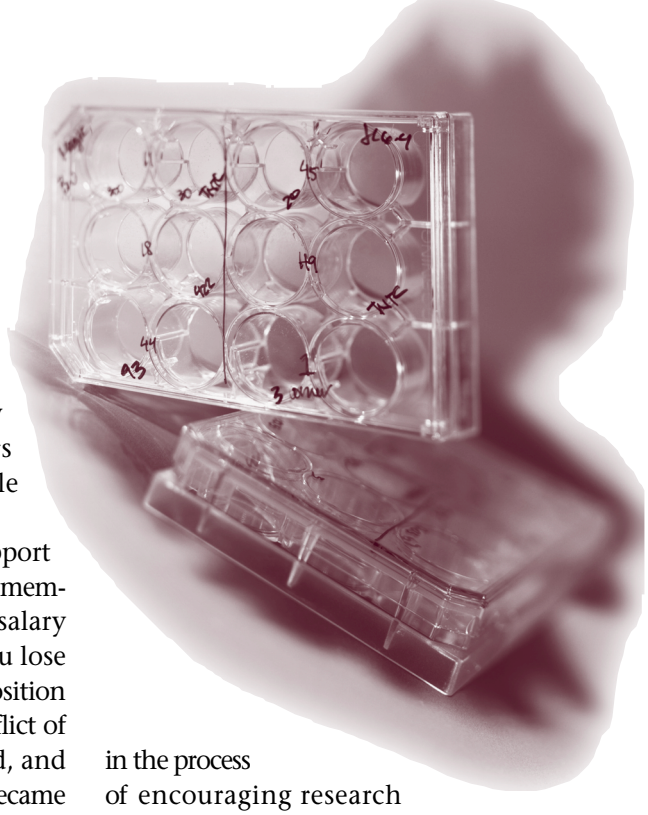
Because the practice of science can be so ambiguous, too much regulation in the attempt to prevent research misconduct is risky. It has the potential to discourage novelty and innovation and, as a result, to damage science.

Promoting integrity in science has both individual and institutional components: encouraging individuals to be intellectually honest in their work and to act responsibly, and encouraging research institutions to provide an environment in which that behavior can thrive. If we think of integrity in that way, it becomes an output that can be analyzed using measures for individuals (e.g., ethical sensitivity) and institutions (e.g., moral climate) that social and behavioral researchers have already devised. Social and behavioral researchers have a lot to do here if, as proposed in the Institute of Medicine report, federal agencies and foundations that provide financial support for research give money for studies designed to identify, measure, and assess the factors that influence integrity in research.

The IOM report suggests that measuring integrity as an institutional outcome would require both external peer review and self-assessment, and recommends that such measurement become an element of institutional accreditation whenever possible. External peer review is essential in measuring integrity — as it is in the practice of science itself. Individuals and institutions alike can aim to be objective but nonetheless be fooled by illusion or self-deception.

Presumably, an institution's self-assessment would include asking individual investigators what kinds of things they do in their research groups to encourage integrity. What a change of emphasis that would be! Although training in the responsible conduct of science exists in various formats at many research institutions, it hardly ever occurs within individual research groups. As long as the apprentice style of science continues, young scientists will be influenced most by what their mentors say and do in practice, not by what professors teach them in classrooms.

Asking investigators how they encourage integrity in their research groups might be just the impetus to get that practice started, if it is not already routine. I suggest a short survey that



would ask if they have explicitly discussed any of the following with members of their research teams: the kinds of information to be recorded in notebooks, and in what detail; the basis on which authorship of papers is decided; the difference between heuristic experiments (from which one learns something new) and demonstrative experiments (which do not necessarily extend an investigator's knowledge but often are necessary for presenting the work to others); reasons for including or excluding data from a presentation in a seminar or from a manuscript; whether it is all right to discuss unpublished findings with researchers in other labs; and what researchers should know about recent and past published literature in their field.

Given the ambiguity of science, I don't believe there is a single correct way to handle any of those issues. Discussing them explicitly, however, introduces moral reasoning and professional values in the context of the research group — the place where we need them most.

Finally, the IOM report recognizes that research organizations operate within a broad context. Government regulations and financial decisions can have as much impact on research groups as local institutional policies do. We hear a lot about the economic impact of governmental policies, as well as their environmental impact. What about their ethical impact?

Many scientists, policy makers, and informed members of the public view individual and institutional conflicts of interest as the greatest ethical problems in science. Individual conflict of interest became particularly problematic in the biomedical sciences in the 1960s, when federal support for research began to be used to pay faculty salaries and professors themselves became responsible for obtaining those funds.

That so-called soft-money support has increased pressure on faculty members to be productive. If your salary comes from soft money and you lose your grant, you may lose your position at the same time. Individual conflict of interest was further exacerbated, and institutional conflict of interest became of increased importance, with the passage of the 1980 Bayh-Dole Act, which permitted institutions to own what their employees had invented with the help of federal funds. That pushed research universities and medical centers into the biotech business.

Whatever the long-term effects of both new policies, they are good examples of how financial and political decisions can affect the ethics of research practice. Beyond the recommendations of the IOM report, an excellent additional step in the process of encouraging research integrity would be for the government and universities to pay closer attention to the ethical impact of their decisions — that is, whether they would promote or discourage ethical research behavior by individual scientists.

Frederick Grinnell is Professor of Cell Biology and Director of the Program in Ethics in Science and Medicine at the University of Texas Southwestern Medical Center at Dallas.

You may visit *The Chronicle* at http://chronicle.com.

President Expected to Sign Bill to Double NSF Budget

By Peter Farnham, Public Affairs Officer

President Bush is expected to sign a bill that authorizes an increase in the National Science Foundation (NSF) budget of $5 billion—more than 100%—over a five year period. The measure, H.R. 4664, the National Science Foundation Authorization Act of 2002, also includes major math and science education initiatives.

The bill is a House-Senate compromise that includes language from four House-passed bills dealing with K-12 math and science education, establishment of a master teachers program, undergraduate science education, and plant biotechnology research, as well as the Senate version of the NSF authorization bill. The compromise was reached in mid-October, but did not come to the Senate floor then because of Administration objections.

H.R. 4664 adds language worked out with the Office of Management and Budget (OMB) to satisfy the Administration's objections. The language makes funding for the last two years of authorization (FY2006 and 2007) contingent on a finding by the Congress that NSF has made successful progress toward meeting certain management goals, taking into consideration OMB's evaluation on that progress. The bill's title was also changed, to replace the word "doubling" with "authorization."

An authorization bill differs from an appropriations bill in several key ways. An appropriations bill provides money to fund a specific program; an authorization bill allows that program to exist in the first place, and sets a maximum funding level for the program. In addition, legislators are not supposed to include policy directives in appropriations bills; these are supposed to be included in authorization bills. Of course, Congress being the flexible institution that it is, these distinctions are often lost or ignored in the thicket of debate, and waivers and exemptions to such rules are common. Nevertheless, this bill, while not providing actual dollars, allows dollars up to a doubling level to be appropriated. Its passage also indicates broad and deep congressional support for more funding for NSF and the wide range of science and education programs it supports.

Doubling the NSF has been a policy goal of ASBMB for the past several years, and the Society has been working very hard to increase congressional interest in and support of the agency since the mid-1990s. The agency's budget was actually cut in fiscal 1997, but since then—when ASBMB began leading the NSF advocacy community toward the adoption of more aggressive tactics on behalf of the agency—the NSF budget has increased by 40%.

In addition to removing "doubling" from the title, and making the last two years of the authorization term contingent upon performance, other elements in the bill that provoked controversy during its torturous path to final passage include:

The President's Math and Science Education Partnerships Program, a merit-based program of grants to local school districts. The Senate version of the NSF bill called for the last two years of this program to be formula-based—that is, money would be distributed to local school districts based on a formula of how many students, schools, etc. The House prevailed on this point, making it clear to the Senate that the NSF had never had a formula program during its more than 50 years of existence, and if the Senate insisted on starting such a program, the House would not approve the bill.

The bill also strengthens the oversight capabilities of the National Science Board, and—in a defeat for the administration—requires a change in how National Science Board staff is appointed. In the past, the NSF has appointed the NSB staff. Under the new legislation, the NSB appoints its own staff. The NSB had sought this change to increase its independence from the NSF.

"Passage of this compromise bill is a great achievement," said Rep. Vernon Ehlers (R-MI). Doubling the NSF budget has been a goal that I have worked on since coming to Congress. If enacted, the research results, while not clear now, will reap huge benefits in the future— just as research on lasers and nuclear magnetic resonance led to advances in construction, medicine, and defense."

Rep. Ralph M. Hall (TX), Ranking Democratic Member of the Science Committee said, "House passage of a five-year doubling for NSF is a win-win situation, a win for federal support of science and a win for the Republicans and Democrats who were able to come together and find a common solution."

Appropriations Picture Still Muddled

While the science community is celebrating the passage of the NSF authorization bill, the appropriations picture continues to look grim. While both the House and Senate appropriations

bills have proposed generous increases for NSF as a whole—about 12% overall in each bill—the VA/HUD bill has still not been sent to the President, and instead is included in an omnibus continuing resolution Congress passed during the lame duck session in November. This resolution remains in place until January 11, funding all covered federal agencies at 2002 levels. There is a very realistic possibility that most 2003 appropriations bills will not be signed into law until early spring 2003—by which time about half the fiscal year will have expired.

ASBMB Welcomes New Ph.D.'s

ASBMB extends its congratulations to these individuals who recently received their Ph.D. degrees. In recognition of their achievement, ASBMB is presenting them with a free one-year membership in the Society. The new Ph.D.'s are listed below with the institution from which they received their degree.

DeeAnne M. Goodenough-Lashua
University of Michigan

Robert M. Jones
Tulane University

Dalia M. Kopustinskiene
Kaunas University of Medicine, Lithuania

Steve C. Lee
Loma Linda University

Michelle M. Spiering
Unversity of Michigan

Olga Steinberg-Neifach
City University of New York — Brooklyn College

Roisin M. Owens
University of Southampton, UK

Guangxing Sun
Einstein Medical College

Tony Yu
Loma Linda University

Proteomic Solutions in Cellular and Developmental Biology and Medicine

May 2 – 4, 2003
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Kansas City, Missouri

Organized by:
Joan W. Conaway, *Stowers Institute*, Ralph A. Bradshaw, *UC, Irvine*, John Walker, *Univ. of Missouri, Columbia*, and Steve Alexander, *Univ. of Missouri, Columbia*

Sponsored by the ASBMB and Stowers Institute

Keynote Lecture
Proteomic Solutions in Cell Biology – Organelle Structure, Function and Signaling Pathways
Proteomic Solutions in Developmental Biology
Proteomic Solutions in Medicine

Membership in the ASBMB is not required for submission of an abstract. Speakers for oral sessions will be selected from the abstracts submitted. Students, postdoctoral fellows, and younger faculty are encouraged to submit a paper for presentation.

For further information contact:
ASBMB Meetings Office
9650 Rockville Pike, Bethesda, MD 20814
Tel: 301-634-7145; Fax: 301-634-7126
Email: kgull@asbmb.faseb.org
Meeting website: http://www.asbmb.org

STOWERS INSTITUTE FOR MEDICAL RESEARCH

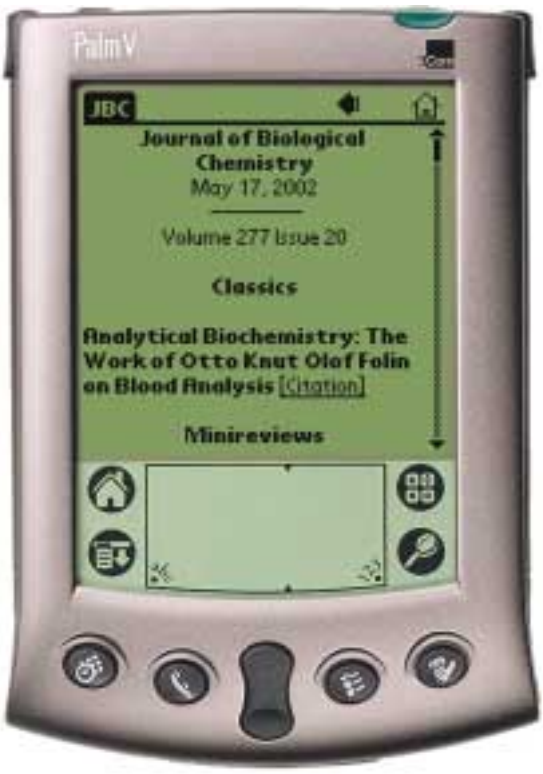
HighWire: The Weekly *JBC* in the Palm of your Hand

Handheld personal digital assistants, or PDAs, are now very popular. In addition to their traditional function as personal organizers, PDAs are being used more and more to access a diverse range of information, from big-name newspapers to baseball scores. The *JBC* is now available to PDA users through HighWire Press' HighWire Remote-Control feature. With HighWire Remote-Control, a PDA user will always have the most recent journal content close at hand.

What Do I Get?

HighWire Remote provides the current table of contents and abstracts for all regular content from *JBC*. The latest TOC and abstracts are available as soon as the new issue is published on the *JBC* website. Each time you "sync," your PDA will check for new-issue content in *JBC* and, if you wish, in any of the other HighWire-hosted journals that offer this feature. The picture shows what the *JBC* looks like on a PDA.

Currently, HighWire Remote will copy the TOC and abstracts for the most recent Friday's new *JBC* issue to your PDA. Each new sync will replace any old issue you have on your PDA with the latest one. In the future, we'll be making it possible to get *The Daily JBC* as new content is published several times a day.



How Does it Work?

This new feature has two simple technical requirements. First, HighWire Remote supports PDAs from manufacturers like Palm, Handspring and Sony, that run the Palm operating system. The Pocket PC operating system is currently not supported. Second, you must have syncing set up between your PDA and an internet-connected PC. Syncing is the process by which the PDA exchanges and updates information between the PDA's calendar, datebook, and task list programs with compatible programs on the PC. Syncing is done via a cradle, which is cabled to the PC.

When you install the HighWire Remote software, a small, custom viewer application (much like a web browser such as Netscape) is loaded on your PDA, and a communication conduit is installed on your PC. Then, when you sync, the most current journal content is delivered from the *JBC* web server to your PDA, via your PC conduit. All with the touch of a button—literally.

How Do I Get Started?

If you have a PDA that runs the Palm operating system, and you're already set up to sync your PDA with your PC, then getting the HighWire Remote feature is straightforward. Just click the "*JBC* in your Palm" link on the *JBC* home page, and follow the instructions. You will be asked for an e-mail address, where a serial number will be sent. Then you will download a small installer, and run it to load the PDA and PC software. The instructions will ask you to enter the serial number, and to sync your PDA.

Once you've installed HighWire Remote, you can also sign up for content from other participating HighWire journals. To do so, go to HighWire's Portal, http://highwire.stanford.edu , and look under the My E-mail Alerts feature.

HighWire Remote will be enhanced with new functionality in the coming months. We think you will find it a dynamic, convenient, and useful new resource. The *JBC* in your pocket. We bet you can't do that with the print *JBC*!

Next month we'll look at new techniques to further refine your search when your search retrieves far too many results to examine.

And *MCP* Too!

Molecular and Cellular Proteomics can be in the palm of your hand too, if you have a PDA that runs the Palm operating system. *MCP* can be accessed at http://www.mcponline.org/pda, and it's on that site where the PDA download capability will be for *MCP*—exactly the same as for *JBC*, but on its own existing journal site.

Career Opportunities

POSTDOCTORAL CANDIDATES

The University of Virginia is seeking postdoctoral candidates to study restenosis after arterial injury in mice. The position requires a PhD, MD, or MD/PhD. Surgical skills are desirable. Salary and rank will be commensurate with experience. This position will remain open until filled. Interested candidates should send a letter of interest and curriculum vitae, plus three references to Weibin Shi, University of Virginia, Department of Radiology, PO Box 800170, Charlottesville, VA 22908. Fax 434 924-9242 or e-mail ws4v@virginia.edu. The University of Virginia is an equal opportunity/affirmative action employer.

PROFESSOR AND HEAD

Department of Animal Sciences
College of Agricultural, Consumer and Environmental Sciences
University of Illinois at Urbana-Champaign

Departmental Description:
The Department of Animal Sciences (http://www.ansci.uiuc.edu/) includes 41 faculty involved in research, teaching, and extension education programs. Departmental faculty have expertise in nutrition, reproductive and lactation physiology, environmental physiology, immunophysiology, molecular and population genetics, anaerobic microbiology, genomics, meat science and muscle biology, and animal management. Professional and support personnel number 125 and the annual departmental budget is greater than 16 million dollars. The department is housed in the Animal Sciences Laboratory, Edward R. Madigan Biotechnology Laboratory, and the Meat Science Laboratory. Research and educational centers for beef and dairy cattle, swine, poultry, horses, and sheep are near campus. Research housing for laboratory and companion animals is located adjacent to the Animal Sciences Laboratory. Complete curricula are offered to over 500 undergraduate majors and 100 graduate students in M.S. and Ph.D. programs in various specializations.

Qualifications:
A Ph.D. in animal sciences or a closely related field is required. The candidate must be tenurable at the rank of full professor, with a strong background in research, resident instruction or outreach education, as well as demonstrated administrative skills. The candidate should have strong communication skills and the ability to work effectively with faculty, students, staff, administrators, and various clientele groups.

Major Responsibilities:
The professor and head of the Department of Animal Sciences is a full-time position responsible for the administration of the research, teaching, and extension programs of the department, specifically:

Providing leadership to the faculty and staff. Establishing goals and developing policy guidelines. Supervising the teaching and extension programs in the department. Administering budgetary and financial matters within the department, including financial accounting, budget preparation, allocation of funds among departmental programs and personnel, and assisting in securing outside support. Planning and implementing programs to develop new departmental research and teaching facilities. Maintaining liaisons with leaders in industry, government, other universities, public groups, and professional societies

Proposed Starting Date:
The position will be filled as soon after May 21, 2003, as a suitable candidate is identified and available.

Salary:
The salary is commensurate with experience and qualifications.

Applications:
To ensure full consideration, candidates should apply by January 10, 2003. The application will include a resumé; names, addresses and telephone numbers of five persons familiar with the candidate's qualifications and experience; and a cover letter with a statement of interest in the position. Send to:
Dr. Gary H. Heichel, Chair of Search Committee
College of Agricultural, Consumer and Environmental Sciences
122 Mumford Hall
1301 West Gregory Drive
Urbana, IL 61801-3605
Telephone: (217) 333-9480 Fax: (217) 244-6342 E-mail: gheichel@uiuc.edu

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ASSOCIATE/FULL PROFESSOR

The Division of Pulmonary and Critical Care Medicine, University of California, Davis, School of Medicine is recruiting a full-time faculty position at the associate or full professor level. Applicant must possess a doctoral degree, preferably in biochemistry, with five to ten years experience in signal transduction pathways and in lung epithelial cell and oxidant signaling research. Applicant must have a strong record of federal research funding (preferably NIH). Strong organizational skills needed to serve as Signal Transduction Lab director. Interested applicants should send a resume to Dr. Timothy Albertson, c/o John Beishke, Division of Pulmonary and Critical Care Medicine, UC Davis Medical Center, 4150 V Street, Suite 3400, Sacramento, CA 95817. This position is open until filled but not later than June 30, 2003. UC Davis is an equal opportunity/affirmative action employer.

Calendar of Scientific Meetings

JANUARY 2003

18th Enzyme Mechanisms Conference

January 4-8 • Galveston Island, Texas
Contact: Andrea Scott; Ph: 979-845-9165; Fx: 979-845-9452
Email: ascott@mail.chem.tamu.edu
Website: http://www.chem.tamu.edu/enzyme

Apoptosis 2003: From Signaling Pathways to Therapeutic Tools

January 29-February 1 • European Parliament Conference Center, Luxembourg
Contact : Marc Diederich; Ph: + 352 46 66 44 434
Fx : + 352 46 66 44 438; Email: meeting@cu.lu

FEBRUARY 2003

Miami Nature Biotechnology Winter Symposium 50 Years On: From The Double Helix To Molecular Medicine

February 1-5 • Radisson Deauville Resort, Miami Beach
Contact: Bill Whelan, wwhelan@miami.edu
Website: http://www.med.miami.edu/mnbws

MARCH 2003

The American Society for Microbiology (ASM) Meeting: Future Directions for Biodefense Research: Development of Countermeasures

March 9-12 • Baltimore Marriott Waterfront, Baltimore
Abstract Deadline: January 30, 2003
Ph: 202-942-9248; Fx: 202-942-9340
Email: meetingsinfo@asmusa.org; www.asmbiodefense.org

Principles and Applications of Time-Resolved Fluorescence Spectroscopy

March 23-28 • University of Maryland Baltimore
Contact: Mary Rosenfeld, Tel: 410-706-8409
Email: cfs@cfs.umbi.umd.edu; Website: http://cfs.umbi.umd.edu

Keystone Symposium, Proteomics: Technologies and Applications

March 25–30 • Keystone Resort, Keystone, Colorado
Contact: Paul Lugauer; Tel.: 970-262-1230 ext. 111
Email: info@keystone.symposia.org
Website: http://www.keystonesymposia.org

APRIL 2003

American Society for Biochemistry and Molecular Biology Annual Meeting in Conjunction with EB2003

April 11-15 • San Diego, California
Contact: EB2003 Office; Ph: 301-634-7010
Fx: 301-634-7014; Email: eb@faseb.org
Website: http://www.faseb.org/meetings/eb2003

Origin and Evolution of Mitochondria and Chloroplasts Advanced Lecture Course for the Federation of European Biochemical Societies (FEBS)

April 5–10 • Hvar, Croatia
Contact: Prof. Dr. Jürgen Soll
Ph: + 49 89 17861 225/273/276; Fx: + 49 89 17861 185
e-mail: hvar2003@botanik.biologie.uni-muenchen.de
Website: http://www.febs.unibe.ch/Activities/Advanced_Courses/Adoc03.htm

MAY 2003

Proteomic Solutions in Cellular and Developmental Biology and Medicine

May 2–4 • Stowers Institute, Kansas City, Missouri
Contact: Kelly Gull; Tel: 301-634-7145; Fx: 301-634-7126
Email: kgull@asbmb.faseb.org; Website: http://www.asbmb.org

10th Undergraduate Microbiology Education Conference

May 16-18 • University of Maryland, College Park, Maryland
Contact: Carlos Pelham; Ph: 202-942-9317
Email: EducationResources@asmusa.org
Website: http://www.asmusa.org/edusrc/edu4c.htm

JUNE 2003

Transposition, Recombination and Applications to Plant Genomics
A Plant Sciences Institute Symposium

June 5-8 • Iowa State University, Ames, Iowa
Abstracts due April 4, 2003; Registration deadline May 5, 2003
Students may apply for travel grants (applications due April 4, 2003)
Contact: Gulshan Singh
Ph: 515-294-7978; Fx: 515-294-2244; E-mail:pbmb@iastate.edu
Website: http://molebio.iastate.edu/-gfst/phomepg.html

ECM IV: Bone Tissue Engineering

June 30-July 2 • Davos, Switzerland
Contact: R. Geoff Richards, Dr. Sci. M.Sc. biol.
Programme Leader AO Research Institute,
Bioperformance of Materials & Devices
email: geoff.richards@ao-asif.ch; Ph: ++41 (0) 81 4142 397
http://www.aofoundation.org/events/ao/ecm/ECMIV/index.shtml

JULY 2003

FEBS 2003 Meeting on Signal Transduction

July 4-8 • Brussels
Contact: V. Wouters; Ph: 32 2 7795959; Fx: 32 2 7795960
Email: febs@iceo.be; Website: http://www.febs-signal.be

Education in the Molecular Life Sciences: The Central Role of Biochemistry and Molecular Biology

July 18-20 • University of Toronto, Canada
Contact: Kelly Gull; Ph: 301-634-7126
Email: kgull@asbmb.faseb.org
http://www.richmond.edu/~jbell2/iubmb-satellite.html

19th International Congress of Biochemistry and Molecular Biology

July 20-24 • Toronto, Canada
Contact: Congress Secretariat; Ph: 613-993-9431
Email: iubmb2003@nrc.ca
Website: http://www.nrc.ca/confserv/iubmb2003/

AUGUST 2003

First Gordon Research Conference on Cellular Osmoregulation: Sensors, Transducers and Regulators

August 15–20 • Roger Williams University, Bristol, RI
Contacts: Janet M. Wood (jwood@uoguelph.ca) and Karlheinz Altendorf (altendorf@biologie.Uni-Osnabrueck.de)
Website: http://www.grc.uri.edu/programs/2003/cellosmo.htm
Application: http://www.grc.org/scripts/dbml.exe?Template=/Application/apply1.dbm

Sixth International Symposium on Mass Spectrometry in the Health and Life Sciences: Molecular and Cellular Proteomics

August 24-28 • Fairmont Hotel, San Francisco
Contact: Marilyn Schwartz; Ph: 415-476-4893
Email: sfms@itsa.ucsf.edu
Website: http://donatello.ucsf.edu/symposium

16th International Mass Spectrometry Society Conference

August 31–September 5 • Edinburgh, Scotland,United Kingdom
Contact: John Monaghan; Email: johnmonaghan@ed.ac.uk
Website: http://www.imsc-edinburgh2003.com

OCTOBER 2003

OARSI's 2003 World Congress on Osteoarthritis

October 12-15 • Palais am Funkturm, Berlin
Contact: OARSI Headquarters
Ph: 202-367-1177; Fx: 202-367-2177
email: oarsi@oarsi.org; Website: www.oarsi.org

SEPTEMBER 2004

Fourth International Conference on Relaxin and Related Peptides

September 5-10 • Jackson Hole, Wyoming
Email: relaxin-2004@ad.uiuc.edu
Website: http://www.life.uiuc.edu/relaxin2004/

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